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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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FARM AND FOREST SUPPLY MANY RAW MATERIALS TO INDUSTRY

A caravan of 50,000 giant five-ton trucks, bumper to bumper, stretching over 236 miles of highway from Washington, D. C., to New York -- or the equivalent in railroad cars -- would be needed to haul at one time the farm products purchased by Du Pont in one pre-war year.

Today even larger tonnages of crops grown on American farms have been added to the colossal procession needed to meet wartime demands for chemicals caused by acceleration of manufacturing and demand for substitutes for unavailable raw materials.

Straining under loads of products from field and forest -- vegetable oils, turpentine, cotton, cotton linters and wood pulp, to name but a few -- trucks and trains carry their burden of agricultural materials daily to chemical factories in various sections of the United States, to be converted into products essential for peace -- and war.

These important raw materials are used in the manufacture of a great variety of articles, many of which are going directly into war channels.

Vast Array of Products Made From Cellulose

Cotton linters and wood pulp are important sources of cellulose, a compound of carbon, hydrogen and oxygen, and from this comes a vast array of products. Most important war material based on cellulose is smokeless powder, absolutely essential to every arm of the service.

Other agricultural products -- chiefly glycerin from fatty oils, and wood flour, also enter into the manufacture of the commercial explosives widely used in quarrying, road-building, removal of stumps and boulders, in gigantic reclamation, hydroelectric and military projects, and in the mining of strategic metals.

From cellulose, Du Pont derives also the cellophane which safeguards packaged goods and army rations, keeping them clean and sanitary and releasing large tonnages of metal formerly used to package foods and other products; "Bubblfil" to replace sponge rubber and the kapok derived from seed pods of a Javanese tree; finishes for military aircraft; motion-picture film to map terrain and record the deeds of our troops in far-flung areas; safety X-ray film to aid in surgery in our civilian and military hospitals; microfilm used for preserving important documents in a small space; rayon and plastics of extraordinary importance; pyroxylin-coated fabrics suitable for rugged utilitarian service in numerous wartime applications; and cellulose sponges, now smashed to one-third their normal size to conserve space for shipment to our forces abroad.

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Corn contributes to the production of commercial dynamite -- a product as essential to agriculture, mining, and construction as smokeless powder is to war. In 1942, the United States used an estimated 450,000,000 pounds of dynamite -- approximately 100,000,000 pounds more than in pre-war years -- to produce more lumber, steel, coal, and copper; to speed building of cantonments, ammunition storages, and harbors; to quarry rock for air bases; to build huge dams for waterpower; to cut and surface hundreds of miles of roadway such as the 1500-mile Alaska military highway; and to blast the drainage ditches and build the levees to help increase American agricultural production.

Vegetable Materials Essential to Chemical Industry

Vegetable materials, essential to the chemical industry, include oils from flaxseed, soybean, cotton seed, tung nuts, not to mention the peanut whose acreage was more than doubled in 1942 -- from less than 2,000,000 to about 4,212,000 -- largely for the meal and oil needed for war purposes. Vegetable oils find application in the manufacture of paints, varnishes, enamels, and lacquers for naval vessels, military aircraft, refrigerators used by our armed forces, and other structures where extreme durability is the prime requirement. Vegetable oils are also used in the manufacture of soap and numerous other industrial and household products.

Ingredients for finishes are derived from turpentine and rosin, extracted from Southern pine trees; and from turpentine also is made the synthetic camphor used in numerous commodities, including motion-picture film and a wide variety of plastic products.

From molasses and grain, Du Pont makes industrial alcohol needed in the manufacture of smokeless powder. From the same fermentation process that yields alcohol, Du Pont obtains also carbon dioxide, essential in the manufacture of dry ice used to safeguard foodstuffs. Alcohol also contributes to safe, winter-time transportation, since denatured anti-freeze alcohol derived from this source protects car and truck cooling systems against freezing in coldest temperatures. From these same raw materials also comes the lactic acid used in the tanning of leather and for numerous other industrial applications.

The Soybean Crop Is An Outstanding Example

An outstanding example of a relatively new farm crop that supplies many industries with raw material is the soybean. As recently as 20 years ago this country grew less than 5,000,000 bushels. The 1942 crop was estimated at more than 200,000,000 bushels, coming from 14,000,000 acres concentrated largely in about six Middle Western states -- much of which will be used to make oil. Those same soybeans will yield, as a by-product, large quantities of meal, a valuable raw material which science has also found useful for human and plant food as well as one of the best protein supplements in livestock feed.

Some of the products obtainable from the soybean crop include glycerin, soaps, soya sauce, confections, linoleum, salad and cooking oils, lard compounds, breadstuffs, ice cream, adhesives, paper coating, glue, and plastics. Among the Lend-Lease items involving processed soybeans are -- in addition to some of those already mentioned -- soy-meal flour, soy grits, protein soup concentrates containing flour and grits, and pork-and-soya sausage.

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NEW CHEMICAL TREATMENTS INCREASE GUM FLOW OF LONGLEAF AND SLASH PINE

The acute labor shortage and the urgent need for production of more resin and turpentine for war uses focus attention on the discovery of two new chemical treatments which greatly increase the gum flow of both longleaf and slash pines.

Research conducted by the U. S. Forest Service in 1942 shows that by modification of the chipping program, 40% sulphuric acid solution applied to fresh streaks or faces will give as good results on longleaf as on slash pine, increasing the average annual flow of gum by 25%. Furthermore, experiments this past year with a large number of other chemicals show that a 25% solution of caustic soda (lye) will increase yields for both species of pine as much as 75% on a weekly chipping schedule.

In 1940 and 1941, experiments conducted with slash pine by the Southern Forest Experiment Station, Lake City, Fla., developed information which changed original recommendations from a 20% solution to a 40% solution of sulphuric acid. Still newer research data now show that the 40% solution is just as effective on longleaf pine, when properly applied.

Tests Conducted On 185,000 Faces

Results reported for 19 commercial operators, conducting tests of chemical stimulation on a total of 185,000 faces, show a range of increased production for approximately the first half of the 1942 season from as high as 60% to as low as practically none. The average was 24.8%. About a fourth of the operators showed increases in gum flow of 40% or better.

"We have also learned this past year that a naval stores producer can make as much or even somewhat more gum by chipping every other week and applying 40% sulphuric acid as he can from his customary weekly chipping untreated, thereby saving considerably on that important item of manpower," says T. A. Liefeld, silviculturist at the Station.

He adds that while much research remains to be done, tests to date show that sulphuric acid and possibly other chemicals prolong the flow of gum over a longer period of time than is the case with untreated chipping.

"This year we tested a large number of chemicals, most of which proved valueless or only slightly effective particularly on longleaf pine," he states. "Probably our most important find, however, is that a 25% solution of caustic soda increased yields from both species as much as 75% on a weekly chipping schedule.

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"Therefore, we plan to recommend the application of 40% sulphuric acid with biweekly chipping or 25% caustic soda with weekly chipping to help the gum naval stores industry meet production and labor conditions for the future."

Mr. Liefeld states that the sulphuric acid can be applied satisfactorily with ordinary paint brushes, but that this method has disadvantages which spraying would eliminate. He adds that brushes are not satisfactory for the caustic soda solution.

"Before the caustic soda treatment can be used commercially, a sprayer must be developed," he said. "We are working with several manufacturers to develop a suitable spraying device for use with both sulphuric acid and caustic soda. We hope one will be available for the 1943 season."

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A DIFFERENT "CROP" FROM A DIFFERENT "FARM"

Eight "paint farms" at widely separated points throughout the country are making important contributions to the war effort. The "crop" consists of thousands of panels ranging from tin plate to steel one-half inch thick, and from Venetian blinds to freight-car sides, all under constant scrutiny.

At these Du Pont research centers, located in California, Colorado, Delaware, Florida, Illinois, Michigan, New Jersey, and Texas, more than a million panels are inspected annually to determine what kind of durability performance thousands of different finish formulations will provide on all types of surfaces under widely different conditions of temperature and humidity.

Faster-drying paints and improved techniques of application are hastening the flow of war materials with paints formulated according to knowledge gained on these "farms."

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SHORTAGE OF NITROGEN RESULTS IN THREE MAJOR CHANGES IN FERTILIZERS

The shortage of nitrogen for fertilizers, due to the huge demand for synthetic nitrogen for war purposes, has brought about three temporary major changes in the wartime manufacture and use of commercial fertilizer mixtures.

First, drastic reduction in the number of analyses or grades from a total of 484 recognized analyses in 1942 to 90 for 1943.

Second, some reduction in the amount of nitrogen used in the formulation of mixed goods.

Third, elimination of the use of fertilizers containing chemical nitrogen on grain crops planted in the fall to be harvested in 1943; and on lawns, golf courses, parks, cemeteries, roadsides, and non-commercial plantings of trees, shrubs, and flowers.

Chemical nitrogen means any other than organic nitrogen, and includes ammonium sulphate, sodium nitrate, calcium cyanamid, "Uramon", and solutions such as Du Pont's urea-ammonia liquors. Organic nitrogen is that derived from any plant or animal organism, including animal, fish and other tankages; castor pomace; tobacco stems; cotton-seed meal; peanut meal; soybean meal; sewage sludge; cocoa-shell meal; peat and humus.

Changes Made Effective by Government Order

The changes were agreed upon by official agronomists and representatives of the government and fertilizer industry at a series of conferences covering 33 important fertilizer-using states during recent months. Recommendations were adopted for each state, based on a contemplated total supply of nitrogen available for fertilizers four-fifths as great as that used during the last fertilizer year. Adequate amounts of phosphorus and potassium, the other elements generally included in complete fertilizers, are available. Subsequent to the meetings, all the grades agreed upon throughout the country were made effective by a WPB order.

Although the new program is based on the assumption that no more than 80 per cent of normal requirements of all nitrogen can be counted on for the 1943 crop year, it is entirely possible that this shortage might be even greater. The agronomists who made the recommendations on which the WPB order is based were all agreed that the grades adopted were emergency ones and, in many instances, not the grades they would have recommended had nitrogen supplies been normal.

The elimination of fertilizers containing chemical nitrogen for the uses indicated is a temporary wartime conservation measure. No restrictions for these purposes have been placed against any fertilizer containing organic nitrogen only. This will undoubtedly ease the situation greatly for lawns, golf courses, and similar uses.

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The amounts of synthetic nitrogen, including ammonia solutions or liquors, being used in fertilizers are greatly restricted at this time, also through government allocation. Concerning this situation, Dr. C.M.A. Stine, a vice president of the Du Pont Company, recently pointed out that wartime expansion of the capacities for synthetic ammonia will have taken on an industrial status after the war that, in terms of new agricultural producing capacity, may be comparable to the discovery of another continent. Certainly, synthetic products, such as Du Pont's urea-ammonia liquors and "Uramon" fertilizer compound (42% urea nitrogen), will again become important sources of fertilizer nitrogen.

Reduction in Number of Grades Considered Desirable

The reduction in the number of grades is generally considered as highly desirable and, with some modifications after the war, may be relatively permanent. It tends to eliminate needless and useless filler, reduce costs of manufacturing, permit a more satisfactory adaptation of grades to rates of application, and -- probably of greatest importance at the moment -- make possible a comparatively equitable distribution among all farmers of the reduced amount of nitrogen allocated for fertilizer use.

Examples of How Reduction Works

As an example of how the reduction works, New Jersey, which had been using 127 different grades, some carrying as much as 9 per cent nitrogen, agreed to get along with only 16 grades, of which six carry no nitrogen at all, two carry only 2 per cent, three 3 per cent, and five 4 per cent.

Two other examples are Mississippi and Alabama, where considerable progress in grade reduction had already been made and where 6 per cent nitrogen mixtures were very popular. In these states, it was agreed to reduce the number of grades even further. Only two and three nitrogen-carrying analyses, respectively, each limited to 4 per cent nitrogen, will be sold in 1943.

Alabama, where 6-8-4 (6 per cent nitrogen, 8 per cent phosphoric acid, and 4 per cent potash) was the leading grade, has been using 12 grades, but will use only 0-14-10, 4-10-4, 4-12-4, and 4-10-7 mixtures in 1943. Mississippi, which had also previously reduced its analyses to only 12, agreed to get along with 0-14-7, 4-8-4, and 4-8-8 grades in 1943.

Number of Grades By States

The number of grades, including those carrying no nitrogen and included in the WPB order, with the number produced in each state as recently as 1939 shown in parentheses, are: Alabama 4 (12), Arkansas 8 (20), Connecticut 12 (70), Delaware 23 (51), Florida 33 (360), Georgia 13 (112), Illinois 17 (66), Indiana 20 (126), Iowa 17 (37), Kentucky 18 (52), Louisiana 10 (32), Maine 12 (65), Maryland 25 (84), Massachusetts 12 (108), Michigan 21 (56), Minnesota 19 (54), Mississippi 3 (12), Missouri 17 (80), New Hampshire 12 (45), New Jersey 16 (127), New York 14 (122), North Carolina 18 (185), Ohio 21 (81), Oklahoma 5 (17), Pennsylvania 23 (121), Rhode Island 10 (49), South Carolina 13 (283), Tennessee 9 (78), Texas 8 (21), Vermont 11 (45), Virginia 26 (136), West Virginia 8 (41), Wisconsin 16 (46).

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No proposals for grades were made for Colorado, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, Wyoming, Arizona, California, Idaho, Oregon, and Washington. All of these states will follow the same procedure in use elsewhere reducing the amount of nitrogen in their fertilizers about 20 per cent.

The reduction in the amount of chemical fertilizer nitrogen available for 1943 has resulted in a widespread re-emphasis on the use during the emergency of organic sources and of legumes, such as clover and hairy vetch, to be plowed under to "grow" nitrogen on the farm. Authorities are also recommending, along with proper use of available fertilizers, attention to liming where needed, and use of manure and composts where available.

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NEW NYLON PAINT-BRUSH BRISTLES CONTRIBUTE TO WAR EFFORT

A nylon bristle with the taper, resiliency, length, inertness to paint ingredients, and toughness necessary for paint brushes is announced by Du Pont. These new bristles wear three times as long as natural bristles which are no longer being imported in quantity from China, Russia, and other foreign countries.

Nylon paint-brush bristles are not available for civilian uses at this time, since the Government is preempting the entire output for military uses.

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NYLON SCREENS THAT WON'T RUST OR REQUIRE PAINTING ARE POST-WAR POSSIBILITY

Nylon screens that will not rust or require painting are a distinct possibility when nylon again becomes available for ordinary peacetime uses. These scientists have woven single heavy strands of nylon into strong, smooth screens through which a sharp-pointed pencil can be pushed without causing permanent damage. The hole can be closed merely by rubbing the fingers over the displaced strands. The screen can be colored permanently by adding pigments to molten nylon. The material is flexible and suitable for roll screens.

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DYNAMITE SAVES VALUABLE TIME AND LABOR IN EXCAVATING DRAINAGE DITCHES

Food does not contain dynamite, but dynamite helps make food.

Because of it, American farmers can grow more wartime foods, feeds, fibers, and fats by improving farm lands through adequate drainage.

Approximately 87,000,000 acres -- an area slightly larger than the total area of Illinois, Indiana, and Ohio combined -- or one-twelfth of the total land area in farms in this country, are served by organized drainage enterprises, according to the U. S. Department of Commerce. Many thousands of additional acres are also being drained by individual farmers who are not included in the figures for organized activities.

This drainage not only helps eliminate the excess water from the soil, but protects against overflow, and aids in reclaiming swamp land for the growing of crops and livestock needed to meet unprecedented government wartime quotas.

The lands in the organized drainage enterprises reported to the government include 126,152 miles of open drainage ditch, which, if in one piece, would carry the drainage waters more than five times around the world at the equator. There are also 55,734 miles of tile drains and 6,793 miles of levees.

U. S. Uses Million Pounds of Dynamite Daily in Peacetime

In normal peacetimes, this country uses a million pounds of dynamite as an engineering tool every day, part of it for farming purposes. Dynamite not only does these jobs well and economically, but it saves valuable time and labor, especially important in wartime when farms and cities alike are without adequate manual help.

Because of the acute labor shortage, farmers all over the country are anxious to use more of their most fertile lands, some of which have not previously been put into cultivated crops because of lack of proper drainage. L. F. Livingston, manager, Du Pont Agricultural Extension Division, reports that county agents and agricultural engineers advise they are being called upon for advice and assistance in construction of drainage ditches on these types of soils, and are recommending use of dynamite for quick and effective results with comparatively small labor requirements.

Du Pont agricultural explosives experts stress the fact that today, especially, it pays to let explosives do as much of the job as possible. They point out that a bit more dynamite is less expensive and far more available than labor, power shovels, shovel teeth, truck bodies, and other equipment and replacement parts needed for man-power-using methods of excavating drainage ditches.

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A PERFECT DITCH BLAST

The force of the explosion moves the heavy material laterally from the ditch, while the fine material is being thrown into the air and is also spread from 200 to 300 feet on either side of the new ditch.

They add that to blast a given length of ditch, only enough man-power is needed to make the holes and place the cartridges. They state that if time is a factor, no other method or equipment is comparable to dynamite for excavating a ditch, which is done by "a series of over-lapping craters, each made by the explosion of an individual charge of dynamite, but so arranged that all of the charges explode at the same time."

In 1942, the United States used an estimated 450,000,000 pounds of dynamite to produce more lumber, steel, coal, and copper; to speed building of cantonments, ammunition dumps, and harbors; to quarry rock for air bases; to build huge dams for waterpower; to cut and surface hundreds of miles of roadway such as the 1500-mile Alaska military highway; and to blast the drainage ditches and build the levees to help increase American agricultural production.

"Concentrated Form of Energy"

Dynamite is a concentrated form of energy -- a "prime mover", as engineers call it -- transported over rough ground and through marsh country with little trouble. They add that where a short job is to be done -- even a dry ditch -- dynamite can be used to advantage. The wetter the material to be blasted, the lower will be the dynamiting costs. Obstructions such as stumps, boulders, or sunken logs -- so difficult to remove by hand or even by machine -- are blasted with the ditch, the material being thrown high in the air and spread for a considerable distance on both sides; and new and fertile topsoil is usually added to the nearby area.

The cost of maintenance and operation was a minor consideration with more than 50,000,000 of the 87,000,000 acres of land drained, since, in many cases, the individual farmer assumed upkeep of the ditches or tile drains on his part of the land after they had been installed. The average cost of installing drainage systems has been $10.72 per acre for all types of drains, with $5.90 an acre for open ditches compared with $11.02 for tile drains.

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NEW PRODUCT TO REPLACE KAPOK STEMS FROM FARM AND FOREST

From farm and forest come the cellulose and other raw materials used in the manufacture of a new product developed to meet the shortage of sponge rubber and kapok in important war uses, such as stuffing for life jackets. Du Pont chemists have accomplished the feat of trapping air in a continuous strand of transparent cellulose. Tiny bubbles of air are placed at regular intervals, creating a material known as "Bubblfil," commercial sale of which must await war necessities. In announcing the discovery of this new contribution of chemical research, Du Pont points out that the trapped air gives "Bubblfil" a high degree of resiliency and buoyancy which opens up a large field of interesting possibilities, such as mattresses and upholstery, for its application.

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EARLY CHEMICAL TREATMENT OF WOUNDS ADVOCATED TO PREVENT LOSS OF LIVESTOCK

The early "smear" and not the early bird gets the screw worm, the blow fly, and the wool maggot, which cause millions of dollars damage annually by infesting wounds of animals, particularly range cattle and sheep in the South and West.

Prompt and efficient treatment will prevent an increase in fly abundance while the weather is most favorable for breeding, according to Prof. M. A. Stewart, associate professor of entomology, University of California College of Agriculture.

In a recent bulletin, he says that such early preventive treatment with Smear No. 62, diphenylamine, or a "pine-tar oil amorphous paraffin - synthetic hydrocarbon polymer mixture" before the wounds are attacked by the maggots is more satisfactory and certainly more economical than treatment after the wounds are infested.

Smear No. 62 Growing Rapidly In Popularity

Smear No. 62, recently developed by the U. S. Bureau of Entomology and Plant Quarantine, is composed of 35 per cent benzol, 10 per cent Turkey Red Oil, 20 per cent lamp black, and 35 per cent diphenylamine. Growing rapidly in popularity, both for prevention and for treatment after infestation, the benzol it contains, in addition to diphenylamine, eliminates the need for separate irrigations of wounds. The benzol not only helps stop the flow of pus, blood, and serum, but its fumes kill any maggots in infested wounds. The smear also is favored because the Turkey Red Oil in it insures complete wetting and saturation of the wound and the lamp black helps form the necessary small crystals of the protective agent.

The primary screw worm, the secondary screw worm, the blow fly, and the wool maggot all produce comparable types of damage to livestock. Hence their prevention and treatment are identical. The primary screw worm prefers very fresh wounds, and produces more damage per individual larva. The blow fly and wool maggot also attack wounds, but commonly infest untagged sheep and fleeces which have been exposed to prolonged spring rains. Treatment of maggot infestations in fleece consists of shearing the infested area and killing the larvae by spraying with benzol.

These various species of maggots are capable of producing extensive wounds, and even causing death, because they feed on animal tissues. Places where secretions are produced, such as the eyes and nostrils, are infested, as well as bite wounds, wet fleeces, and wounds caused by dehorning, castration, and docking operations. Even slight scratches from such causes as the thorns of cactus plants, and fly and tick bite wounds are attacked. The larger wounds may become so heavily infested that the animals die in two or three days, unless they are treated.

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Dr. Stewart points out that prevention of infestation requires reduction in the number of wounds occurring and in the inhibition of the breeding of the flies. When consistent with good animal-husbandry practice, necessary surgical operations and dates of birth of young should coincide with the time or times of the year when flies are absent or scarce. Regulation of birth dates helps eliminate the danger of infestation of the unhealed navels of newly-born animals.

All Animals Should Be Inspected Regularly

All animals should be regularly inspected for both large and small wounds and for soiled tags during those seasons of the year when the flies are abundant. All wounds should be treated as a measure of prevention, he states.

Dr. Stewart says Smear No. 62 is spread over the entire wound with an appropriate implement at intervals of several days, depending on local conditions, until the wound is completely healed.

Diphenylamine Kills Young Maggots Before They Can Injure Tissues

If diphenylamine is used separately, it must be finely ground so that at least 50 per cent will pass through a screen having 40 meshes to the inch and at least 90 per cent through a 20-mesh screen. Diphenylamine alone does not prevent the flies from laying their eggs on wounds, but it kills the small maggots hatching from the eggs before they can injure the tissues. In treating either infested or uninfested wounds, enough diphenylamine should be used to cover the injured tissues completely. In wounds that are bleeding freely, it is necessary to put on small quantities of the diphenylamine at frequent intervals, and to hold it in place until the bleeding is sufficiently reduced so the chemical will not wash away.

If the diphenylamine is used as a preventive, no benzol is needed. If used on infested wounds, the diphenylamine should be applied after the wound has been swabbed with a piece of cotton, and benzol has been sprayed into all parts of the wound to stop flow of blood and serum. A second application of benzol, followed by plugging the wound with cotton to confine the fumes, will kill all maggots that breathe the fumes. Following removal of the maggots, the diphenylamine should be applied to the wound.

Detailed instructions for both prevention and treatment of infested wounds are included in the California bulletin, which will be sent on request.

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DISCUSSES PHENOTHIAZINE BEFORE ANIMAL AND POULTRY FOUNDATION

A new livestock vermifuge, introduced commercially by Du Pont in 1940, has developed rapidly to become one of the nation's most potent weapons in combatting death and weight losses due to certain types of internal parasites -- losses which normally cost American farmers an estimated $125,000,000 annually.

This drug, phenothiazine, is used for the treatment of cattle, horses, mules, sheep, goats, hogs, chickens, and turkeys, with three-fourths or more of all that used in 1942 going into the control of parasites of sheep and goats, Dr. W. E. Gordon, Du Pont technical representative, said in an address before the annual autumn meeting of the Animal and Poultry Foundation in Kansas City.

"From several agricultural experiment stations and leading sheep raisers we have received reports in which phenothiazine is claimed to be the basis for revival of sheep raising in certain areas," Dr. Gordon said. "Once pasture lands become heavily infested with parasites, sheep raising can no longer be conducted with profit. The advent of phenothiazine has changed this picture to a marked degree."

Shows Every Indication of Continued Growth In Popularity

Dr. Gordon said this new drug, used for removal of several kinds of parasites from nearly all kinds of livestock and poultry, shows every indication for continued growth in popularity.

"Livestock is important, not only as a source of food," he declared, "but also for wool, mohair, surgical sutures, hides, pelts, and numerous other products. In time of war, losses in production become doubly serious because of the greatly increased demand and the difficulties in obtaining supplies from foreign countries.

"And while pasture rotation, sanitation, and other sound methods of farm and ranch management are fundamental to the success of any parasite-control program, the practical difficulties encountered in putting these measures into effect have made it necessary for livestock producers to depend upon anthelmintic drugs for adequate protection of their stock. Phenothiazine is the newest drug in this field, and the success achieved with this treatment has been little less than spectacular."

He pointed out that the rapid growth in the demand for phenothiazine may be attributed in part to the fact that recommendations for its use are based on the results of reliable clinical data developed by scientists of the Bureau of Animal Industry and various agricultural experiment stations.

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NEW U.S.D.A. BULLETIN TELLS HOW TO CONTROL NODULAR DISEASE OF SHEEP

The first comprehensive official government bulletin telling in detail how nodular worm disease of sheep can be controlled by the use of phenothiazine has just been published by the U. S. Department of Agriculture.

Leaflet 228, "Nodular Worm Disease of Sheep," by M. P. Sarles and A. O. Foster of the Bureau of Animal Industry, stresses the need for nodule-free sheep intestines which, it says, are urgently needed for the production of high-quality, absorbable sutures used by surgeons in closing wounds and for ligatures.

"The great demand for sutures for supplying the United Nations, the armed forces of the United States, and civilian needs makes it desirable to combat nodular worm disease with the utmost energy. Sheep raisers have the opportunity and responsibility, therefore, of making a distinct contribution to the Nation's war efforts by eradicating nodular worms from their flocks and thereby preventing further inroads of this parasite. By so doing farmers will be safeguarding and increasing the supply of a raw product (nodule-free sheep intestines) which is urgently needed for the production of this vitally important material. At the same time they will be assuring for themselves dividends in the form of better prices and profits."

The leaflet from which the accompanying pictures were taken, tells how nodular worms may be controlled and eradicated.

Recommends Use of Phenothiazine, Pasture Hygiene and General Sanitation

"The practical prevention of nodular disease can be achieved in greatest measure by timely treatment with phenothiazine in conjunction with pasture hygiene and general sanitation," it says. "Phenothiazine is effective for the removal of adult nodular worms from the large intestine and has the added advantage of effective action against most of the other economically important roundworm parasites of sheep."

Dosage Recommendations of the U. S. Government

The following dosage recommendations are given:

The dose for adult sheep is approximately 1 ounce.

For lambs weighing less than 60 pounds, a dose of one-half ounce is generally adequate.

"It may be administered in capsules, in feed, or in the form of a drench and should be given under the supervision of a veterinarian.

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"A satisfactory suspension for use as a drench can be prepared by thoroughly mixing 25 grams of the drug with 15 cc. (½ fluid ounce) of molasses and then mixing this with enough warm water to make 45 cc. or 1½ ounces.

"Many proprietary products containing phenothiazine are specifically designed for use as drenches or as prepared capsules; these should be used according to the directions accompanying them.

"The administration of phenothiazine in feed appeals to flock owners because of its relative simplicity and greater economy, and, in limited trials, this method of treatment has proved to be safe and especially well adapted for worming pregnant ewes.

"Only a few animals should be treated in one group and they should be sufficiently hungry to consume the medicated feed in from a few hours to a day."

The following formula has been used for treatment of sheep in groups of five:

Phenothiazine	4½ ounces
Molasses	4 fluid ounces
Water	3 fluid ounces
Mixed grain feed	4 pounds

"A simpler mixture, involving the addition of the drug directly to moistened grain, has also been used with good results. In this case it may be necessary to use a slightly larger amount of feed. Thorough mixing is essential. There should be available at the trough sufficient space for all animals to feed at the same time. Sheep varying greatly in size should not be treated together. Weak animals should be treated separately, or watched to make sure that they are consuming enough of the medicated mixture. There should be access to water at all times."

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PHENOTHIAZINE IS NEAREST APPROACH TO IDEAL ANTHELMINTIC

The nearest approach to the ideal worm remover is phenothiazine which appears to be "the most useful anthelmintic yet discovered," says the 1942 U. S. Department of Agriculture Yearbook.

"No other known anthelmintic removes so many different kinds of parasites from the host animals as does phenothiazine," the Yearbook says. It points out that the ideal drug -- one that, without harm to the host, would kill all or practically all the parasites harbored by the animal -- has not yet been discovered. However, it adds that phenothiazine, the use of which as an anthelmintic was developed by the U. S. Bureau of Animal Industry during the last three years, administered in proper therapeutic doses in a capsule, in a drench, or in feed, is efficacious for removing stomach worms and related trichostrongyles, as well as hookworms and nodular worms from cattle, sheep, and goats; palisade or red worms and related strongyles from horses; and nodular worms from swine.

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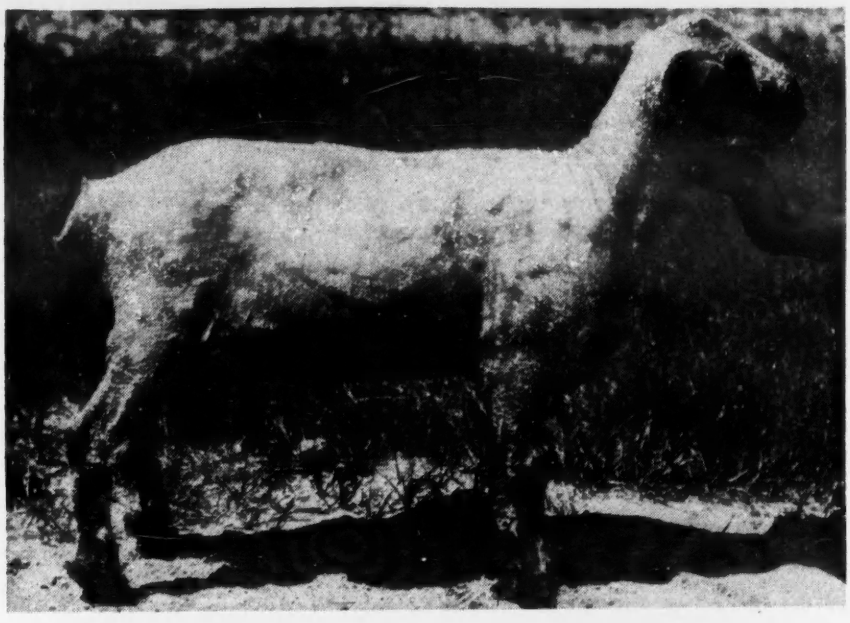
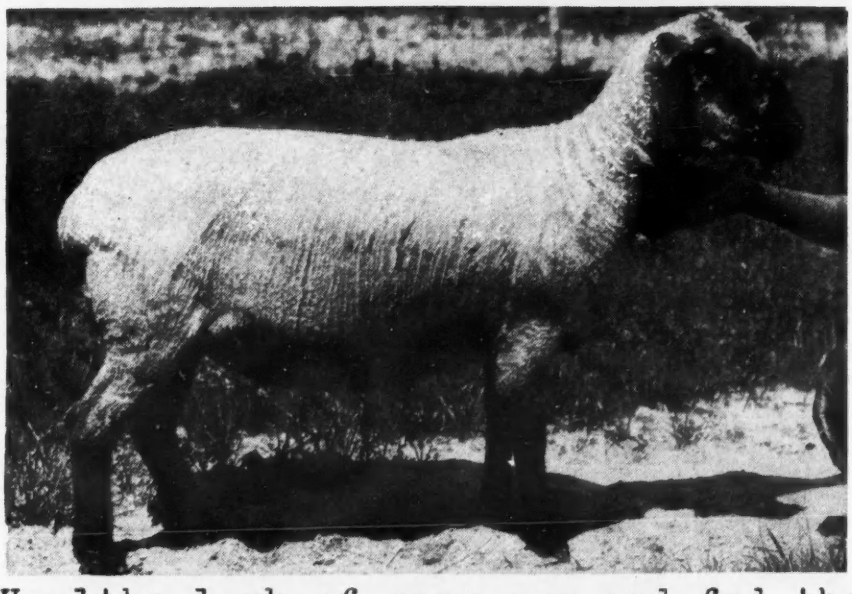
UNTREATED



This lamb, 58 weeks old, shows stunted and emaciated condition resulting from heavy infestation with nodular worms.

TREATED WITH PHENOTHIAZINE



Healthy lamb of same age and fed the same ration as the worm-infested lamb shown above. Note excellent development and finish.

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PHENOTHIAZINE KILLS COCKROACHES

Cockroaches can swallow phenothiazine without harm, but if this chemical touches the outside of their bodies it kills the pests "deader than a doornail."

The phenothiazine passes through the shells of the roaches, and is apparently converted into another compound which really does the killing.

John W. Zukel of Iowa State College, Ames, says that the finer the particles of phenothiazine, the smaller the size of the deadly dose needed.

Du Pont chemists state that phenothiazine, while under test as an insecticide for some time, has found its most successful use as a killer of certain parasitic worms of livestock and of cecal worms in poultry. And, dusted on chickens, it has been found to give almost complete control of lice.

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"GUARDIANS OF PLENTY" -- NEW FILM STORY OF PEST-CONTROL RESEARCH

Have you ever seen a codling moth emerge from its cocoon -- a lethal chamber for flies -- an aphid bearing living young?

These and many other unusual scenes are part of a new 26-minute motion picture "Guardians of Plenty," in color and sound. This film shows for the first time the "behind-the-scenes" drama in the testing of pest-control chemicals -- weapons to protect the vital food products of our farms.

Du Pont's Grasselli Chemicals Department, announcing the new picture, stresses the fact that "to protect America's food supply, we must win the battle against insects and diseases that cost us three billion dollars a year in waste!"

They point out that in this war against waste, chemistry is proving itself a helpful ally, "for there is a close relationship between the chemist and the farmer, as scientists stand behind the lines serving the grower -- spending their lives studying the habits of pests and developing means of control."

To depict the informative and entertaining story of pest-control research, the picture takes the audience through one of the most unusual laboratories of its kind in the world -- the Du Pont Pest Control Research Laboratory at Wilmington, Delaware.

Information on how to obtain a 16 mm. print may be obtained by writing the editor of the Du Pont "Agricultural News Letter," Wilmington, Delaware.

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PAINT PROTECTS INSULATING BOARDS IN POULTRY HOUSES

Painting commercial insulating board used in poultry houses protects the material from injury due to picking by the birds.

While experiments at the New Jersey Agricultural Experiment Station indicate that gray paint is most effective, Professors E. R. Gross and H. E. Besley of the Department of Agricultural Engineering there, recommend paint that makes a hard glossy surface, regardless of color. They advise two or three coats to insure the desired film thickness. The first coat should be a primer-sealer to seal the surface so that following coats of paint or enamel do not sink in.

Loose fibers seem to encourage picking. Among eight different kinds of insulating board tested, the softer, more fibrous and lighter colored boards were subject to greater rates of picking. Only the harder boards should be used.

Hens Seem to Have Less Desire to Pick at Certain Colors

Although the results indicated that color alone will not protect against picking, hens seemed to have less desire to pick at some colors. However, the position of the test panel with respect to light seems to influence the rate of picking about as much as does the color. For example, gray was picked the least; yet when a gray panel was placed where the light was brightest, it was picked at about the same rate as the other colors.

In the tests, plain water colors, dull finish, listed in decreasing order of the rate at which they were picked were: blue, black, red, green, and gray. Oil paints or enamels offer more resistance to picking, giving a harder surface and tending to lay loose fibers. These better finishes ranked in the same order, except that yellow boards were picked very badly. The fact that blue and black were picked more rapidly in this test is contrary to the claim sometimes made that blue retards or controls picking. White casein paint was picked only slightly, ranking well up with gray water finish.

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